**Calibration options when model forced with Fmort**

1. Option 1

Fmort for non-target or assessed species not based on catches, but based on randon value

Scalar\_rmax as per OPTION 1 in R

Effort matrix as per OPTION 1 in R

Calibration on k, r\_max and Q

Error function yield, extinction, SSB, rank abundance

1. Option 2

Fmort for non-target or assessed species based on relative changes in catches

Scalar\_rmax as per OPTION 2 in R

Effort matrix as per OPTION 2 in R

Calibration on k, r\_max and Q

Error function yield, extinction, SSB, rank abundance

1. Option 3

Fmort for non-target or assessed species based on relative changes in catches

Scalar\_rmax as per OPTION 3 in R

Effort matrix as per OPTION 3 in R

Calibration on k, r\_max and Q

Error function yield, extinction, SSB, rank abundance, extinction in unfished community

NOTE: found error when analysing results from calibration – kappa\_ben was set equal to kappa, but this was not done during calibration. This mostly lead to **extinction of squalus** – interpretation of results from above options may be biased

1. Option 4

Fmort for non-target or assessed species based on relative changes in catches

Scalar\_rmax as per OPTION 3 in R

Effort matrix as per OPTION 3 in R

Beta and sigma as per data

w\_bb\_cutoff = 100 instead of 150

Calibration on k, r\_max and Q

NOTE: fit before calibration a little bit poorest than option 3, but now using more error functions to calibrate so hopefully will be ok

Error function yield, extinction based on declines in the last n years instead of extinctions, SSB, rank abundance, decreases in biomass between fished and unfished community

NOTE: gives OK results but **squalus declines** with no fishing

1. Option 5 NEVER RUN - This is about trying to use h and ks as per Mizer and beta and sigma as per data

Fmort for non-target or assessed species based on relative changes in catches

Scalar\_rmax as per OPTION 3? in R

Effort matrix as per OPTION 3? in R

Beta and sigma as per data

H as per Asta, and ks = h \*0.15 similar to Mizer (ks = h \*0.20) – see trials below

w\_bb\_cutoff = 100 instead of 150

Calibration on k, r\_max and Q

Error function yield, extinction based on declines in the last n years instead of extinctions, SSB, rank abundance, decreases in biomass between fished and unfished community

Problems when using h and ks as per mizer and beta and sigma as per data:

Squalus, pristo, galeus declining. Mustelus increasing

No diet interaction

Further trials end of doc

1. Option 6

Same as option 2, which seemed to be the working one in terms of interactions etc, but with new error functions and after the bug in option 3 was fixed:

Fmort for non-target or assessed species based on relative changes in catches

Scalar\_rmax as per OPTION 2 in R

Effort matrix as per OPTION 2 in R

H and ks as per Asta, beta and sigma as per 100 and 1000

Difference from option 2 -> squalus mortality increased by 2 instead of 3.5 (mistake) and w\_bb\_cutoff = 100 instead of 150 (mistake)

Calibration on k, r\_max and Q

Error function yield, extinction based on declines in the last n years instead of extinctions, SSB, rank abundance, decreases in biomass between fished community

Better description of error function:

Yield

SSB + changes in SSB between fished and unfished

Rank abundances

Extinction as in decreases in biomass during the last time steps for a fished and unfished community

NOTE: Best results are the one calibrating K and R with catches and Q and R with catches and SSB. BUT **squalus declines** in both version -extinction error not high enough ? still don’t understand what’s happening – now increased and hopefully OK. Also no results for calibrating K and R with catches and SSB (the one I am most interested in)

1. Option 7

Similar to option 2:

Scalar\_rmax as per OPTION 2 in R

Effort matrix as per OPTION 2 in R

Theta as per option 2 + macrurus-squalus interaction as per option 3 (decreased)

H and ks as per Asta, beta and sigma as per 100 and 1000

w\_bb\_cutoff = 100 instead of 150

Calibration on k & kappa\_ben, r\_max and Q

Calibration time increased to 20 h

Error functions:

Yield

SSB + changes in SSB between fished and unfished

Rank abundances now transformed into CPUE

Extinction as in decreases in biomass during the last time steps for a fished and for an unfished community – penalty = 500 if extinction occurs

NOTE -> might need to force calibration of kappa, and R using catch and SSB as you are mainly interested in this option – see line 35 of remoteCalibration\_loop

NOTE: Almost all **error 52**: "ERROR: ABNORMAL\_TERMINATION\_IN\_LNSRCH". The extinction penalty actually working discharged a lot of options?

Ok results with yield, SSB, kappa, kappa\_ben, r\_max

Now Running …. force yield, cpue, kappa, kappa\_ben, and r\_max

**Trial for h and ks – see option 4 above**

h and ks as per Asta and beta as per data -> no declines, but no diet interactions

h ks gamma

|  |  |  |  |
| --- | --- | --- | --- |
| myctophids | 20.91887 | 5 | 1099.437 |
| sillago flindersi | 43.26221 | 4.526878 | 3393.237 |
| nototodarus gouldi | 51.38628 | 3.398088 | 9056.56 |
| helicolenus barathri | 53.13537 | 3.213714 | 6602.766 |
| trachurus declivis | 53.65226 | 3.162278 | 2982.107 |
| centroberyx affinis | 55.47847 | 2.990698 | 4796.673 |
| squalus spp. | 57.77501 | 2.795202 | 5052.147 |
| nemadactylus macropterus | 58.65833 | 2.725402 | 5098.594 |
| platycephalus richardsoni | 58.95738 | 2.7024 | 5471.703 |
| zeus faber | 58.95738 | 2.7024 | 7090.747 |
| seriolella brama | 64.7594 | 2.311046 | 4559.004 |
| hoplostethus atlanticus | 66.94755 | 2.18653 | 17957.096 |
| macruronus novaezelandiae | 66.94755 | 2.18653 | 12442.962 |
| seriolella punctata | 67.38413 | 2.162971 | 3764.816 |
| rexea solandri | 75.78583 | 1.778279 | 15977.048 |
| genypterus blacodes | 78.36543 | 1.681793 | 11274.941 |
| pristiophorus cirratus | 80.26268 | 1.616059 | 8950.013 |
| mustelus antarcticus | 80.93526 | 1.593739 | 9025.011 |
| galeorhinus galeus | 84.28543 | 1.489564 | 7358.74 |

Is beta responsible for diet interaction?

h and ks as per mizer, beta 100 -> Not much more interaction, and more declines

h and ks as per mizer, beta and sigma as per data

|  |  |  |  |
| --- | --- | --- | --- |
| myctophids | 36.416802 | 7.28336 | 1913.9646 |
| sillago flindersi | 27.789767 | 5.557953 | 2179.6678 |
| nototodarus gouldi | 41.620794 | 8.324159 | 7335.4444 |
| helicolenus barathri | 10.493214 | 2.098643 | 1303.9194 |
| trachurus declivis | 20.95546 | 4.191092 | 1164.7492 |
| centroberyx affinis | 26.248355 | 5.249671 | 2269.4348 |
| squalus spp. | 5.342699 | 1.06854 | 467.1933 |
| nemadactylus macropterus | 21.390647 | 4.278129 | 1859.2793 |
| platycephalus richardsoni | 34.854365 | 6.970873 | 3234.7558 |
| zeus faber | 36.056239 | 7.211248 | 4336.449 |
| seriolella brama | 28.132015 | 5.626403 | 1980.4686 |
| hoplostethus atlanticus | 7.014081 | 1.402816 | 1881.3611 |
| macruronus novaezelandiae | 35.389227 | 7.077845 | 6577.4891 |
| seriolella punctata | 59.840186 | 11.968037 | 3343.3284 |
| rexea solandri | 44.51721 | 8.903442 | 9385.0475 |
| genypterus blacodes | 30.537198 | 6.10744 | 4393.5845 |
| pristiophorus cirratus | 31.011714 | 6.202343 | 3458.0858 |
| mustelus antarcticus | 37.606822 | 7.521364 | 4193.4999 |
| galeorhinus galeus | 34.571898 | 6.91438 | 3018.3819 |

h as per Asta and ks as per mizer + beta as per data

|  |  |  |  |
| --- | --- | --- | --- |
|  | h | ks | gamma |
| myctophids | 20.91887 | 4.183774 | 1099.437 |
| sillago flindersi | 43.26221 | 8.652443 | 3393.237 |
| nototodarus gouldi | 51.38628 | 10.277256 | 9056.56 |
| helicolenus barathri | 53.13537 | 10.627074 | 6602.766 |
| trachurus declivis | 53.65226 | 10.730452 | 2982.107 |
| centroberyx affinis | 55.47847 | 11.095695 | 4796.673 |
| squalus spp. | 57.77501 | 11.555003 | 5052.147 |
| nemadactylus macropterus | 58.65833 | 11.731666 | 5098.594 |
| platycephalus richardsoni | 58.95738 | 11.791476 | 5471.703 |
| zeus faber | 58.95738 | 11.791476 | 7090.747 |
| seriolella brama | 64.7594 | 12.95188 | 4559.004 |
| hoplostethus atlanticus | 66.94755 | 13.389511 | 17957.096 |
| macruronus novaezelandiae | 66.94755 | 13.389511 | 12442.962 |
| seriolella punctata | 67.38413 | 13.476826 | 3764.816 |
| rexea solandri | 75.78583 | 15.157166 | 15977.048 |
| genypterus blacodes | 78.36543 | 15.673085 | 11274.941 |
| pristiophorus cirratus | 80.26268 | 16.052536 | 8950.013 |
| mustelus antarcticus | 80.93526 | 16.187052 | 9025.011 |
| galeorhinus galeus | 84.28543 | 16.857086 | 7358.74 |

ks as per Asta and h as per mizer + beta as per data

|  |  |  |  |
| --- | --- | --- | --- |
| myctophids | 36.416802 | 5 | 1913.9646 |
| sillago flindersi | 27.789767 | 4.526878 | 2179.6678 |
| nototodarus gouldi | 41.620794 | 3.398088 | 7335.4444 |
| helicolenus barathri | 10.493214 | 3.213714 | 1303.9194 |
| trachurus declivis | 20.95546 | 3.162278 | 1164.7492 |
| centroberyx affinis | 26.248355 | 2.990698 | 2269.4348 |
| squalus spp. | 5.342699 | 2.795202 | 467.1933 |
| nemadactylus macropterus | 21.390647 | 2.725402 | 1859.2793 |
| platycephalus richardsoni | 34.854365 | 2.7024 | 3234.7558 |
| zeus faber | 36.056239 | 2.7024 | 4336.449 |
| seriolella brama | 28.132015 | 2.311046 | 1980.4686 |
| hoplostethus atlanticus | 7.014081 | 2.18653 | 1881.3611 |
| macruronus novaezelandiae | 35.389227 | 2.18653 | 6577.4891 |
| seriolella punctata | 59.840186 | 2.162971 | 3343.3284 |
| rexea solandri | 44.51721 | 1.778279 | 9385.0475 |
| genypterus blacodes | 30.537198 | 1.681793 | 4393.5845 |
| pristiophorus cirratus | 31.011714 | 1.616059 | 3458.0858 |
| mustelus antarcticus | 37.606822 | 1.593739 | 4193.4999 |
| galeorhinus galeus | 34.571898 | 1.489564 | 3018.3819 |

Tried to use mizer default and change h, ks and gamma as per above, but nothing changes….